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| EXAMINER | |
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| AKHAVANNIK, HUSSEIN | |

| ART UNIT | PAPER NUMBER |
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| 2621 | |

DATE MAILED: 05/19/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 09/678,451 | TANAKA, NOBUYUKI | |
| | Examiner | Art Unit | |
| | Hussein Akhavannik | 2621 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☐ Responsive to communication(s) filed on _____.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-6* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *1,3 and 4* is/are allowed.

6)☒ Claim(s) *2,5 and 6* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *05 March 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *7,8*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

## DETAILED ACTION

### *Response to Amendment*

1. The amendments to the specification overcome the Examiner's objections cited in paragraph 1 of the previous office action (now Paper No. 6).

2. The amendment to claim 3 overcomes the Examiner's objections cited in paragraph 2 of the previous office action (now Paper No. 6).

3. The amendments to claims 1, 3-4, and 6 overcome the Examiner's 35 U.S.C. second paragraph rejection of these claims cited in paragraph 5 of the previous office action (now Paper No. 6).

### *Drawings*

4. The drawings were received on March 5, 2004. These drawings are accepted.

### *Allowable Subject Matter*

5. Claims 1 and 3-4 are allowed.

6. The following is a statement of reasons for the indication of allowable subject matter:

The closest cited prior art (U.S. Patent No. 6,175,639) fails to teach or suggest the feature of each of the first to j-th electronic watermark data having two values depending on the magnitude of a movement, one value corresponding to low movement and the other corresponding to high movement, when the movement value is compared with a threshold value and the movement is based on a generation amount from the DCT converter in view of the addition features of independent claims 1 and 3-4.

***Response to Arguments***

7. Applicant's arguments, see page 13, lines 17-21, filed March 5, 2004, with respect to claims 1, 3, and 4 have been fully considered and are persuasive. The 35 U.S.C. 103 rejections of claims 1 and 3-4 have been withdrawn.

8. Applicant's arguments filed March 5, 2004 with respect to claims 2 and 5-6 have been fully considered but they are not persuasive.

On page 15, lines 2-9 of the Remarks, the Applicant alleges that Kim et al fail to teach determining the magnitude of movement based on the DCT coefficient of a front frame and a DCT coefficient of a rear frame, as recited in independent claim 2. The Examiner respectfully disagrees. Kim et al explain on page 105, first column, third and fourth paragraph that the motion information ($M_b$) for a video signal is calculated. It is inherent that motion information for a video signal is calculated from the information of a first frame (corresponding to a front frame) and a second, subsequent frame (corresponding to a rear frame). Thus, the system of Kim et al does determine the magnitude of motion based on a DCT coefficient from a front frame and a rear frame.

Furthermore, the feature of deciding the magnitude of a movement by obtaining a difference between a DCT coefficient of a front frame and a DCT coefficient of a rear frame and an electronic watermark data with a suitable strength being inserted according to the magnitude of the movement recited in claim 2, is recited in the whereby clause of an apparatus claim. This clause does not alter the structure of the claimed apparatus recited in earlier steps and is therefore, not given any patentable weight (see MPEP 2114).

On page 15, lines 2-9 of the Remarks, the Applicant alleges that Kim et al fail to teach an electronic watermark data table having two values for each watermark (also for each picture type) depending on the magnitude of a movement, one value corresponding to low movement and the other corresponding to high movement, when the movement is compared with a threshold value. The Examiner agrees that Kim et al fail to disclose this feature, however, claims 2 and 5 do not recite this feature.

***Claim Rejections - 35 USC § 103***

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Florencio et al (U.S. Patent No. 6,208,745) in view of Kim et al (Kim, S-W. et al., "Perceptually Tuned Robust Watermarking Scheme for Digital Video using Motion Entropy Masking," IEEE Proc. Int. Conf. on Consumer Electronics, Jun. 1999, pp. 104-105).

Referring to claim 2,

i. A DCT converter for extracting a block of k * k pixels from an original image, subjecting the block to DCT, and outputting data after the DCT conversion is explained by Florencio et al in column 3, lines 43-56.

ii. Quantizing DCT coefficients output from the DCT converter is explained by Florencio et al in column 3, lines 56-58.

iii. Deciding the magnitude of a movement based on a generation amount from the DCT converter is not explicitly explained by Florencio et al. However, Kim et al do illustrate determining the magnitude of a movement in the DCT domain in figure 1 by the motion entropy masking. Kim et al explain that $M_b$ is the motion information (e.g. motion vector that contains direction and magnitude) for a block b on page 105, first column, third and fourth paragraphs. Kim et al explain that determining the magnitude of motion in video is beneficial because the human visual system decreases its sensitivity to the motions as the number of motions increases on page 105, first column, third paragraph. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to determine the magnitude of a movement in video in a watermarking system based on DCT coefficients, such as the system of Florencio et al, to more effectively embed the watermark.

iv. Deciding a picture type is explained by Florencio et al in column 4, line 57 to column 5, line 7. Florencio et al explain inserting a proper watermark depending on the picture type in MPEG video and would therefore have to detect the picture type of each frame before embedding the correct watermark.

v. Storing an original watermark data is illustrated by Florencio et al in figure 1 by the watermark processor 104. The watermark processor is explained by Florencio et al to generate a watermark in column 4, lines 44-56.

vi. j first multipliers for subjecting the original watermark to multiplication data according to the picture type is explained by Florencio et al in column 4, line 57 to column 5, line 7. Florencio et al explain making the watermark more or less prominent

within a display by adjusting (multiplying) the amplitude of the DCT coefficients of the watermark. The adjustment is performed depending on the frame type detected. Specifically, Florencio et al explain adjusting the original watermark when embedding the watermark in the I or P frames because the watermark will appear on the screen for longer durations in these frames due to the inherent nature of MPEG encoding. In the system of Florencio et al, there would be 3 (corresponding to j) multipliers due to the 3 types of frames.

vii. An electronic watermark table for storing the electronic watermark data of the j types ranging form the first electronic data to the j-th electronic watermark data being outputs from the j multipliers is illustrated by Florencio et al in figure 2 by the data storage device 200 of the watermark processor 104 which is capable of storing the j watermarks output from the multipliers explained in part vii of this claim.

viii. Selecting electronic watermark data of one type among the electronic watermark data of j types is explained by Florencio et al in column 5, lines 47-58. Florencio et al explain choosing a watermark using the watermark generator (208 of figure 2), such as digitized logo or company name that is adjusted by the j multipliers corresponding to the j pictures types of MPEG video.

ix. Subjecting the selected electronic watermark data to multiplication according to the magnitude of a movement obtained based on a difference between the DCT coefficients is not explicitly explained by Florencio et al. However, Kim et al do explain determining the motion of a block in a frame of MPEG video on page 105, first column, third to fourth paragraph. Kim et al then further explain scaling (multiplying) the

watermark (JND) by the motion entropy ($w_{u,v,b}$) on page 105, first column, fifth paragraph. By incorporating the motion determination and thresholding of Kim et al into the stored watermark table of Florencio et al, the frame type selected watermark data would be optimized for movement within the original video. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to subject the selected watermark data to multiplication according to the magnitude of movement obtained in order to more effectively (increased imperceptibility) embed a watermark in a frame of video.

x. Inserting electronic watermark data obtained through multiplication by the second multiplier into data after the DCT conversion is explained by Florencio et al in column 5, line 59 to column 6, line 10 wherein the watermark is inserted into the bitstream by the watermark encoder.

xi. Deciding the magnitude of a movement by obtaining a difference between a DCT coefficient of a front frame and a DCT coefficient of a rear frame and an electronic watermark data with a suitable strength being inserted according to the magnitude of the movement is not explicitly explained by Florencio et al. However, Kim et al explain on page 105, first column, third and fourth paragraph that the motion information for a video signal is determined. It is inherent that motion information for a video signal is calculated from the information of a first frame (corresponding to a front frame) and a second, subsequent frame (corresponding to a rear frame). Kim et al also explain on page 105, first column, fifth paragraph that the watermark coefficients are scaled by the motion entropy calculated. Thus, the watermark coefficients are embedded with a

suitable strength according to the magnitude of the motion detected between the frames. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to determine the magnitude of movement between DCT coefficients of succeeding frames and inserting a watermark of suitable strength in an original image so that the watermark is embedded in video more effectively (increased imperceptibility).

11. Claims 5-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Florencio et al in view of Kim et al, and further in view of Satoh et al (U.S. Patent No. 6,175,639).

Referring to claim 5,

i. A DCT converter for extracting a block of k * k pixels from an original image, subjecting the block to DCT, and outputting data after the DCT conversion corresponds to claim 2i.

ii. Quantizing DCT coefficients output from the DCT converter corresponds to claim 2ii.

iii. Deciding the magnitude of a movement based on a generation amount from the DCT converter corresponds to claim 2iii.

iv. Deciding a picture type corresponds to claim 2iv.

v. Storing an original watermark data corresponds to claim 2v.

vi. j first multipliers for subjecting the original watermark to multiplication data according to the picture type corresponds to claim 2vi.

vii. An electronic watermark table for storing the electronic watermark data of the j types ranging form the first electronic data to the j-th electronic watermark data being outputs from the j multipliers corresponds to claim 2vii.

viii. Selecting electronic watermark data of one type among the electronic watermark data of j types corresponds to claim 2viii.

ix. Subjecting the selected electronic watermark data to multiplication according to the magnitude of a movement obtained based on a difference between the DCT coefficients corresponds to claim 2ix.

x. Inserting electronic watermark data obtained through multiplication by the second multiplier into data after the DCT conversion corresponds to claim 2x.

xi. Inverse-quantizing a block of k * k pixels in which the electronic watermark data is inserted is not explicitly explained by Florencio et al or Kim et al. However, Satoh et al explain inverse-quantizing a block of k * k pixels in column 19, lines 12-16. It would have been obvious to one of ordinary skill in the art at the time the invention was made to inverse-quantize a block of k * k pixels so that a quantized image may be uncompressed.

xii. Performing an IDCT is not explicitly explained by Florencio et al or Kim et al. However, Satoh et al explain performing an IDCT in column 19, lines 16-20. It would have been obvious to one of ordinary skill in the art at the time the invention was made to perform an IDCT on watermarked DCT coefficients so that the watermarked image may be viewed in the spatial domain.

Referring to claim 6, the first multiplier and the second multiplier being omitted with the multiplication coefficient is 1 is not explicitly explained by Florencio et al, Kim et al, or Satoh et al. However, it is obvious that that a number multiplied by 1 is the original number. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to omit the first and second multipliers when the multiplication coefficient is 1, as the

multiplication would not serve any purpose and computation time and power would be conserved.

***Conclusion***

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Suda (U.S. Patent No. 6,639,996) – To exhibit embedding a watermark only in frames with a movement above a threshold as explained in column 4, lines 7-30.

13. THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hussein Akhavannik whose telephone number is (703)306-4049. The examiner can normally be reached on M-F 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Leo H. Boudreau can be reached on (703)305-4706. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Hussein Akhavannik H.A.
May 17, 2004

LEO BOUDREAU
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600